

A Climate Change Impact Assessment for the Upper St. John and Allagash River Watersheds (ME)

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Highlighted Sectors: Forestry, Nature-based Recreation, Habitat Conservation

Geographic boundaries: This region includes the Upper St. John River watershed in the U.S., the Allagash River watershed, and a portion of the Upper West Branch of the Penobscot River Watershed (Fig. 1).

Description: This region is defined by three large undammed rivers, the dominance of the commercial forest landowners, and largely unsettled forest lands. The area is 98% forested with its 3.5 million acres composed almost entirely of commercial forest land which is the primary economic activity (McWilliams et al. 2003)). Its forests have provided nearby mills with a continual flow of sawlogs, pulpwood, and biomass for energy. Conflict over second-home development has emerged south of this region but development levels in this region are relatively low (Bell 2007). The St. John River is the longest free-flowing river in the eastern U.S (St. John River Advisory Committee 2002). The region is also noted for the Allagash River and West Branch of the Penobscot River. These remote rivers and adjacent forests provide week-long backcountry canoe experiences unparalleled in eastern U.S. The 92-mile Allagash Wilderness Waterway, the first state-managed “wild” river in the national Wild and Scenic River System, was created through a cooperative state-federal effort in the 1960's.

Organizations that could contribute to climate change adaptation:

Municipalities with climate change adaptation capacity: <none>

Regional Planning Organizations: Maine Land Use Regulation Commission

Land Conservation Organizations: Forest Society of Maine, New England Forestry Foundation, The Nature Conservancy - Maine Chapter, Trust for Public Land

Other Conservation Organizations: Natural Resources Council of Maine

Major Forest Landowners: J.D. Irving, Maine Bureau of Parks and Lands, Pingree Heirs, Typhoon LLC, Wagner Forest Management

Recreational Organizations: Eleven snowmobile clubs and two ATV clubs exist within or adjacent to this region

Educational Institutions: University of Maine at Ft. Kent, and University of Maine at Orono

Other: North Maine Woods

Some Key Sector Attributes:

Forestry: The timber industry is a mainstay of the economy and by far the dominant land use in this region. Large commercial forest companies own virtually the entire land base and maintain a network of 3,000 miles of permanent logging roads. In Aroostook County, about 36% of the forestland is in northern hardwood, 45% is in spruce-fir forest types, 2% in oak and/or pine forest types, 15% in birch and aspen types, and the balance is in miscellaneous forest types. About 30% of the forest is pole timber and 34% is sawtimber with a balance in seedlings/saplings. Pulp and paper mills (in Millinocket, East Millinocket, and Madawaska), about a dozen sawmills (e.g., Ashland, Masardis, Portage, and St. Leonard), and biomass plants are essential markets for wood fiber from this region and lie at the periphery of the region. A little more than one-half the forest area has been certified (almost evenly split between FSC and SFI). Weak global

markets have affected the forest products sector in this region and have resulted in the shutdown of sawmills in Ashland.

Nature-based Recreation: Upper portions of the St. John, Allagash, and West Branch of the Penobscot Rivers are the most remote rivers in all of New England and provide renowned multi-day backcountry canoe tripping. The region includes 12 sporting camps for hunting, fishing, and other outdoor recreation. It includes two ITS [Interconnected Trail System] snowmobile trails on its northern boundary. The Northern Forest Canoe Trail ends in this region. Although this region has the lowest deer densities in the State due to winter weather, the availability of trophy buck attracts many hunters. The region has excellent black bear habitat. Moose hunters experience one of the most successful big game hunts in North America with a hunter success rate of >90%. Timber harvesting has created quality habitat for hunting woodcock, ruffed grouse, and snowshoe hare. Habitat for waterfowl hunting is limited. Ice fishing is popular and the area supports both warm and cold-water fisheries in its many lakes, streams, and rivers. The St. John River watershed contains native brook trout and landlocked salmon populations offering a renowned fishing experience due to remote location and limited access. The North Maine Woods is a landowner organization that charges access fees to maintain public access to this area and control activity (e.g., restrictions on ATV and mountain bike access).

Habitat conservation:

Unique Features: This region is the second largest block of intact forest in the eastern United States and includes the longest undammed river segment in the eastern U.S. It includes nearly a full suite of its original species (excepting caribou and timber wolf) and is the only region in the eastern U.S. with a nearly intact list of carnivore species (D. Harrison, pers. comm.). It harbors about 10,000 acres of old growth forest, half of which can be found in Big Reed Preserve (owned by TNC-ME). These intact river systems and the unfragmented forest landscape contain intact aquatic ecosystems, a nearly full complement of native carnivores, and critical habitat for the federally threatened Canada lynx and other rare species. The conservation of the St. John River is a top national priority for The Nature Conservancy. The St. John River has a rivershore ecosystem of national significance that supports many high quality occurrences of riverside seeps, and high energy riverbank and circumneutral shoreline communities which contain 20 rare plant species, including the endemic and federally listed Furbish's lousewort (*Pedicularis furbishiae*). Although most of the land is privately owned by timber companies, about one-third of the land is held in working forest easements. Private working forests contribute much of the wildlife habitat in the region but may threaten species requiring large (>1000 acre) blocks of mature forest (e.g., pine marten) and old forest species. Exotic and invasive species are not a high threat to habitats in this region though exotic wetland plant species (including purple loosestrife) are present and non-native fish species (e.g., walleye, bait fish, small mouth bass) pose local threats to native cold water species.

Federal Lands: <none>

State lands: The region has no federal ownership but has several key conservation areas including Deboullie Twp. Public Reserved Land (29,000 acres, including the 7,253 acre Deboullie Ecological Reserve of upland forest, swamps, and pond), Allagash Wilderness Waterway (23,000 acres), Gero Island Public Reserved Land (32,000 acres which includes 3,180 acres in the Gero Island Ecological Reserve), Telos Public Reserved Land, Chamberlain Lake Public Reserved Land (which includes 2,895 acres in the Chamberlain Ecological Reserve), St. John Ponds Ecological Reserve (3,887 acres of upland, wetland, and open water), and Round Pond Public Reserved Land (19,000 acres), and over 1.3 million acres of working forest easement.

NGO lands: The Nature Conservancy-ME St. John Property (310,000 acres in easement, 27,000 in fee ownership), Big Reed Old-growth Preserve (about 5,500 acres).

Other High-value Areas (largely lacking permanent protection): Baker Branch - St John River Focus Area (2700 acres), Big Reed Focus Area Focus Area (5300 acres, protected), Big Ten Peatlands Focus Area (1900 acres), Black Brook - Birch River Headwaters Focus Area (5300 acres), Chandler Deadwater and Malcolm Branch Focus Area (4000 acres), Debouille Ponds and Hills Focus Area (16,000 acres), Depot Stream Wetlands Focus Area (5300 acres), Green Mountain Focus Area (6000 acres), Eagle Lake Region Focus Area (22,000 acres), Ellis Bog - Carry Bog - Smith Brook Focus Area (17,000 acres), St. John River Focus Area (67,000 acres), St John River - Burntland Brook to Nine Mile Bridge Focus Area (6500 acres), St.

John River -Seven Islands and White Pond Fen Focus Area (4000 acres), St. John River SW Branch (9400 acres), West Branch Penobscot Fens Focus Area (8500 acres).

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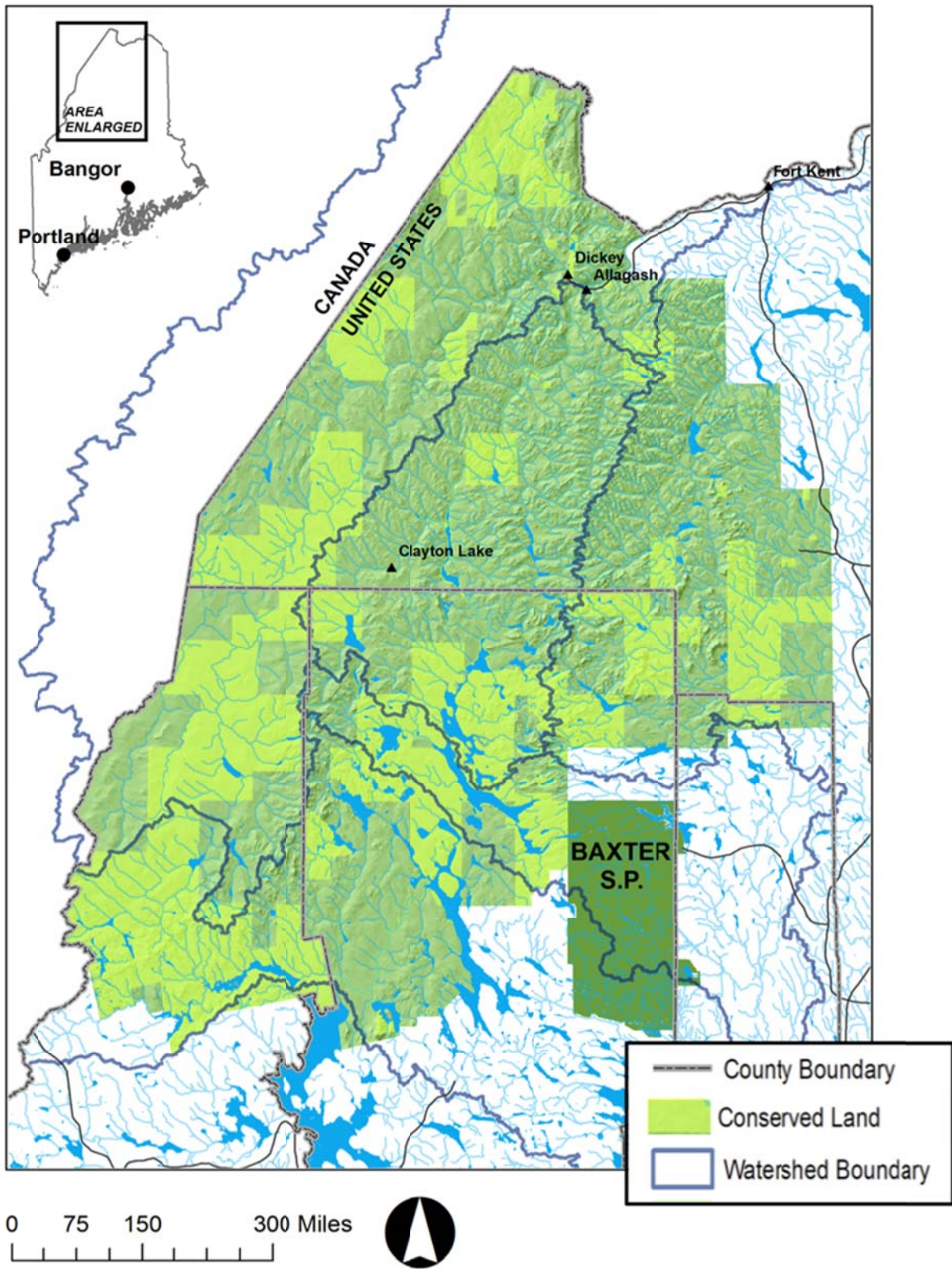
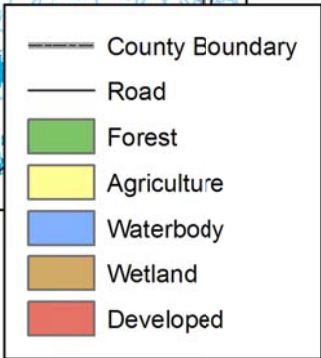
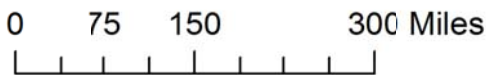
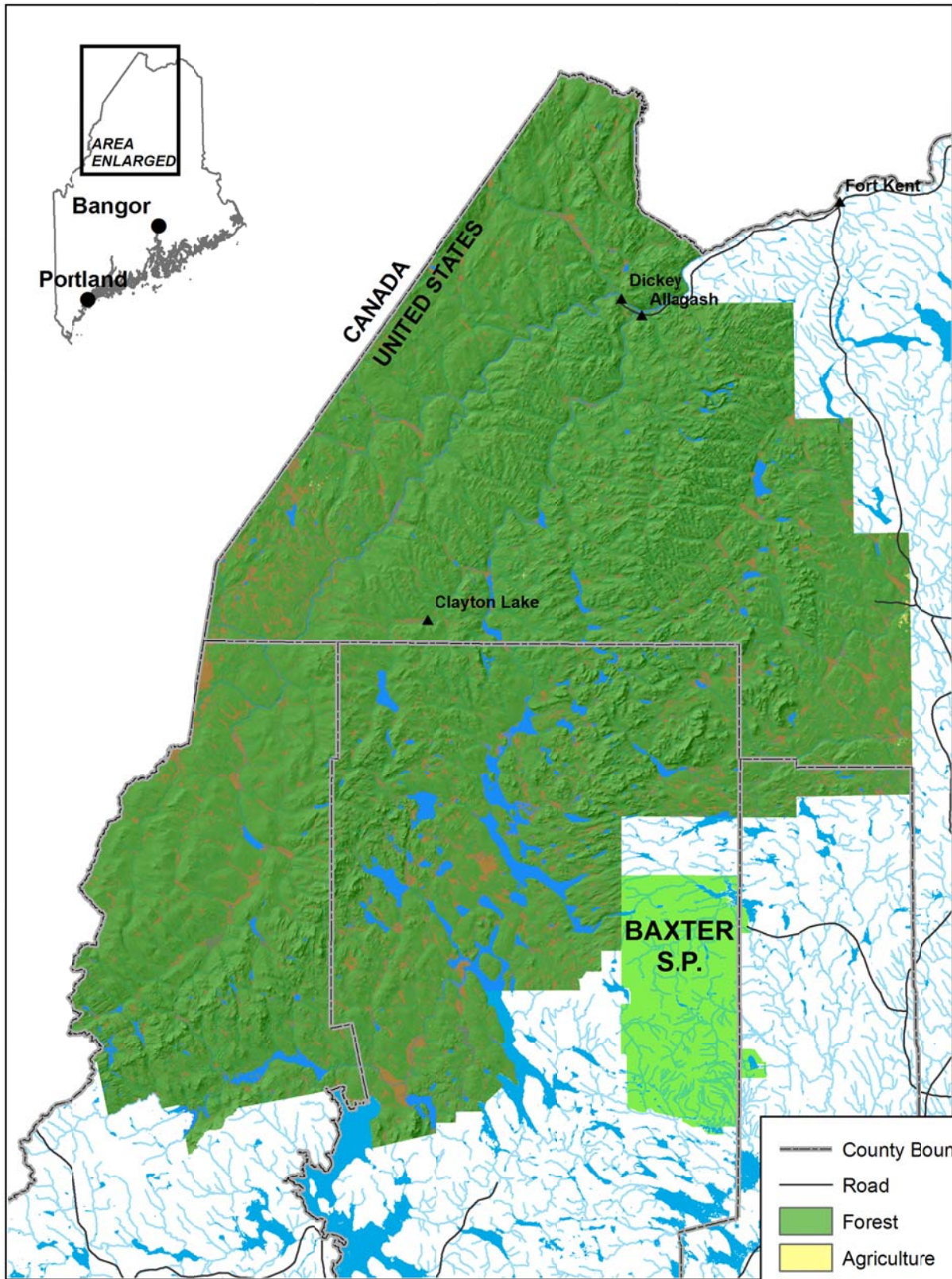


Fig. 1: The Upper St. John and Allagash Rivers Region



Projected Impacts and Strategies for Nature-based Recreation and Forestry

Forestry

Component of Managed Forest System - Climate Changes	Potential Impact	Size & likelihood of Potential Impact without Action		Possible Actions	Who can best implement the action?*	What other sectors should be engaged?
		2010-2040	2041-2100			
Logging Systems						
• Logging Operations						
- slightly more frequent extreme rainfall events - more frequent winter thaws/rains	- additional infrequent saturated and/or unfrozen soil conditions that limit logging operations - shorter winter logging season - possible temporary wood shortages	Moderate	High			
- slightly more frequent drought	- more harvesting of forested wetlands	Low	Moderate			
• Haul Roads						
- slightly more extreme rainfall events - more frequent winter thaws	- more frequent stream crossing "bow outs" - more frequent haul road closings due to unfrozen or saturated soil	High	High			
Forest Health						
Pests, pathogens, and invasive species						
- warmer temps. lead to increase of populations of tree pests & pathogens	- greater tree mortality	Low	Moderate			
- warmer temps. Increases populations of invasive plant species	- reduced tree recruitment	Low	Low			
Extreme weather events (including ozone)						
- Extreme heat increases O3 concentration & damages trees	- reduced tree growth and recruitment	Low	Low			
- increased frequency of droughts & flooding	- reduced tree growth and recruitment - greater tree mortality - greater frequency of forest fire	Low	Low			
- slightly more frequent extended winter thaws	- dieback in spruce, birch, and other hardwood spp.	Moderate	Moderate			
Productivity (CO2 fertilization)						
- increases in CO2 levels	- increased tree growth for aspen spp	Low	Moderate			
Forest tree species						
• North hardwood and Conifer species						
- warmer temp. - more frequent late growing season drought	- reduction in regeneration of northern hardwood and northern conifer spp. - slightly greater mortality of northern hardwood and northern conifer spp.	Low	Moderate			
	- reduction in abundance of northern hardwood and northern conifers	Low	Low			
• Southern tree species (Oak and Pine)						
- temp. increases - more frequent late growing season drought	-significant increase in abundance of oak and pine	Low	Moderate			

*e.g., landowner, local/regional government, NGO, state government, and/or federal government.

Nature-based recreation

Recreation Activities - Climate Changes	Potential Impact	Size & likelihood of Potential Impact		Possible Actions	Who can best implement the action?*	Other sectors to be engaged:
		2010-2040	2041-2100			
Water Recreation						
• Fishing						
- warmer temps. - more frequent extreme heat events	- increased cold water fish mortality & decline in cold water fisheries - increase in warm water fisheries - greater eutrophication with negative impacts on fisheries	Low	Moderate			
- shorter season with ice	- shorter ice fishing season - longer open water fishing season	Low	Moderate			
• Boating						
- more frequent drought	- boat launches may become seasonally high/dry and limit water access	Moderate	Moderate			
- warmer temperatures - more frequent extreme heat events	- longer boating season - increased boating	Moderate	Moderate			
• Whitewater Boating						
- more frequent winter thaws - shorter season with ice	- possible winter whitewater boating	Moderate	Moderate			
- more frequent drought - less snow and lower/earlier spring runoff	- reduced spring whitewater conditions - less water for dam releases for summer season whitewater boating	Moderate	High			
- more frequent extreme rainfall events	- unpredictable opportunities for white water boating during summer	High	High			
Land-based Recreation						
Winter trail sports (snowmobiling, snowshoeing, and X-country skiing)						
- warmer winters - more frequent winter thaws	- Shorter season for winter trail sports - Less snow on trails/reduced trail quality	Low	Moderate			
- more frequent extreme rainfall events	- more frequent "blow outs" of constructed trail stream crossings	Moderate	Moderate			
Trail sports (ATVing, hiking, mtn. biking, horseback riding)						
- warmer temperatures	- longer trail sport season	Moderate	High			
- more frequent extreme rainfall events	- more frequent "blow outs" of trail stream crossings	Moderate	Moderate			
- warmer summer temperatures - more frequent summer extreme heat events	- hiking and mountain biking less popular in middle of summer	Low	Low			
• Camping						
- warmer summer temperatures - more frequent summer extreme heat events	- mid-summer camping becomes less popular	Low	Low			
• Hunting						
- prolonged warm weather in fall period	- best hunting times shift to later in year	Low	Moderate			
- warmer temperature	- increases in white-tailed deer population	Low	Moderate			
• Wildlife Viewing						
- warmer temperatures - more frequent extreme heat events	*- northward range shifts of charismatic species (e.g., moose, loons, puffins) and iconic boreal bird communities, and reduction in their populations *- decline in moose viewing due to pop. decline from tick infestations & heat stress *- more white-tailed deer viewing due to population increase	Low	Moderate			

*e.g., landowner, local/regional government, NGO, state government, and/or federal government.

Habitat Conservation

Biodiversity Component - Climate Changes	Potential Impact	Size & likelihood of Potential Impact without Action		Possible Actions	Who can implement the action?	Other sectors to engage
		2010-2040	2041-2100			
Landscape Elements						
Large Blocks of Habitat & Habitat connectivity - warmer temperatures - more frequent drought	- more frequent forest fires and forest pest outbreaks reduce block size resulting in younger forest and/or open forest types	Low	Low			
Enduring features (e.g., soils, aspect etc.) - more frequent late-growing season drought - more frequent drought	- more frequent forest fire increasing soil erosion	Low	Low			
Habitat						
Northern hardwood forest & northern coniferous forest communities - warmer temperatures - more frequent late-growing season drought - more frequent drought	- reduction in extent of northern hardwood forest and northern conifer forests due to less tree regeneration and increase mortality - northward shift of distribution of forest types - more frequent forest fire burning northern conifer types	Low	Moderate			
Oak and pine forest communities - warmer temperatures - more frequent late-growing season drought - more frequent drought	- increase in extent of oak and pine forests - increase levels of chronic stress due to greater populations of forest pests, pathogens, and invasive spp., levels of O3, and populations of white-tailed deer	Low	Moderate			
Freshwater wetlands, stream/river shore plant communities, and waterbodies - drought - increase fluctuations in water levels - more frequent extreme rainfall events	- habitat area may decline in drought years - more frequent stream scouring and sedimentation events from storms	Moderate	Moderate			
Species						
Northern species at southern edge of range (e.g., Canada lynx, American marten, Blackpoll warbler) - warmer temperatures	- reductions in population size	Low	Moderate			
Southern species at northern edge of range (e.g., white tailed deer, gray fox) - warmer temperatures - less severe winters	- increased population size, expanded range of spp.	Moderate	High			
Wetland and Aquatic Species - winter rain flooding - reduced spring flows - more frequent drought - warmer temperatures - more frequent extreme rainfall events	- reduces populations of cold-water species (e.g., salmonids, some macroinvertebrates) due to increased temperature-related mortality - reduction in populations of wetland species (e.g., wetland plants, low nesting marsh birds) due to stress from more variable hydrology - increased stream sedimentation from storms	Low	Moderate			
Wildlife Health - warmer temperatures	- healthy winter population and increase population size of deer - increased tick infestations & extreme heat reduces moose populations	Low	Moderate			

